FIG. 1

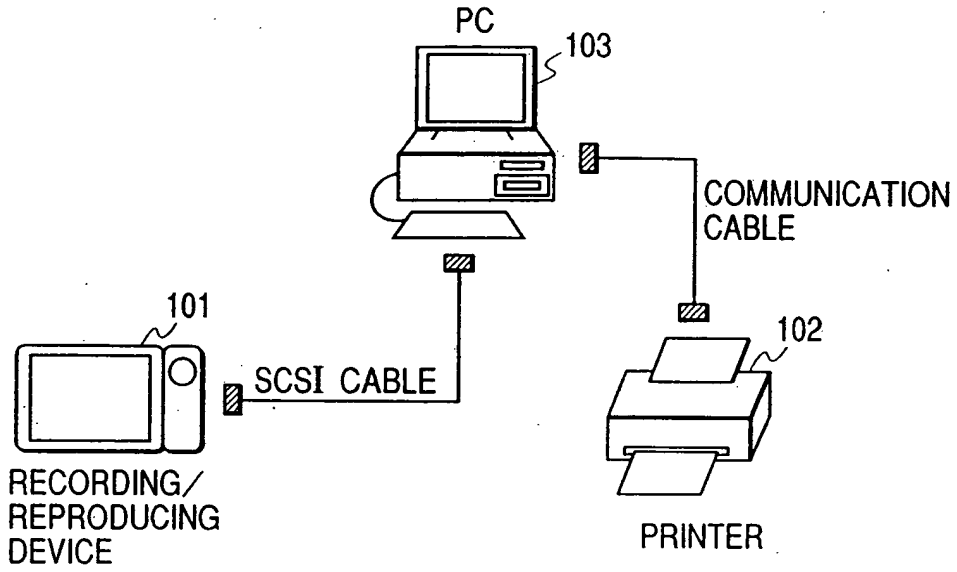

PC
103
COMMUNICATION CABLE
101
SCSI CABLE
102
RECORDING/ REPRODUCING DEVICE
PRINTER

FIG. 2

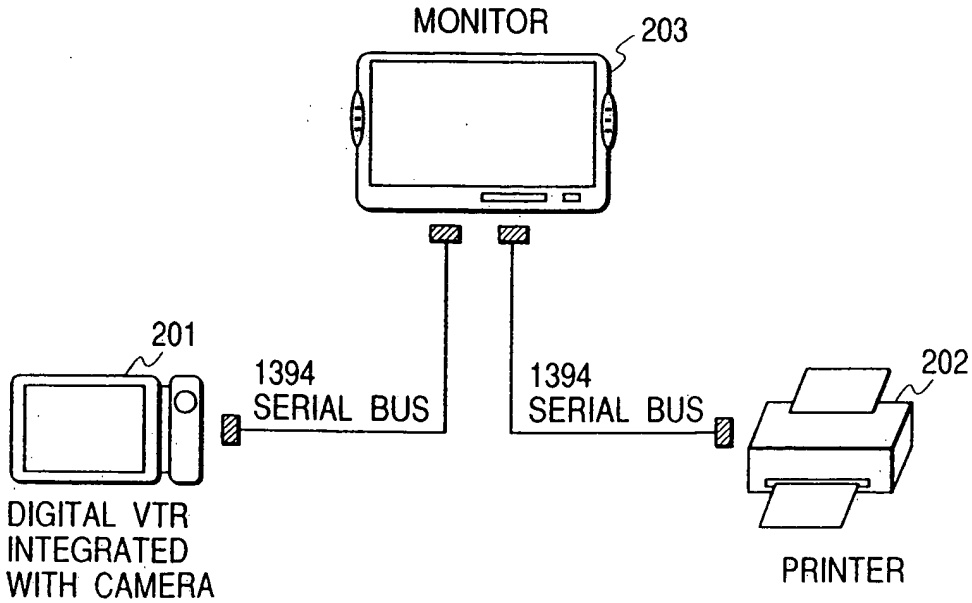

MONITOR
203
201
1394 SERIAL BUS
1394 SERIAL BUS
202
DIGITAL VTR INTEGRATED WITH CAMERA
PRINTER

FIG. 3

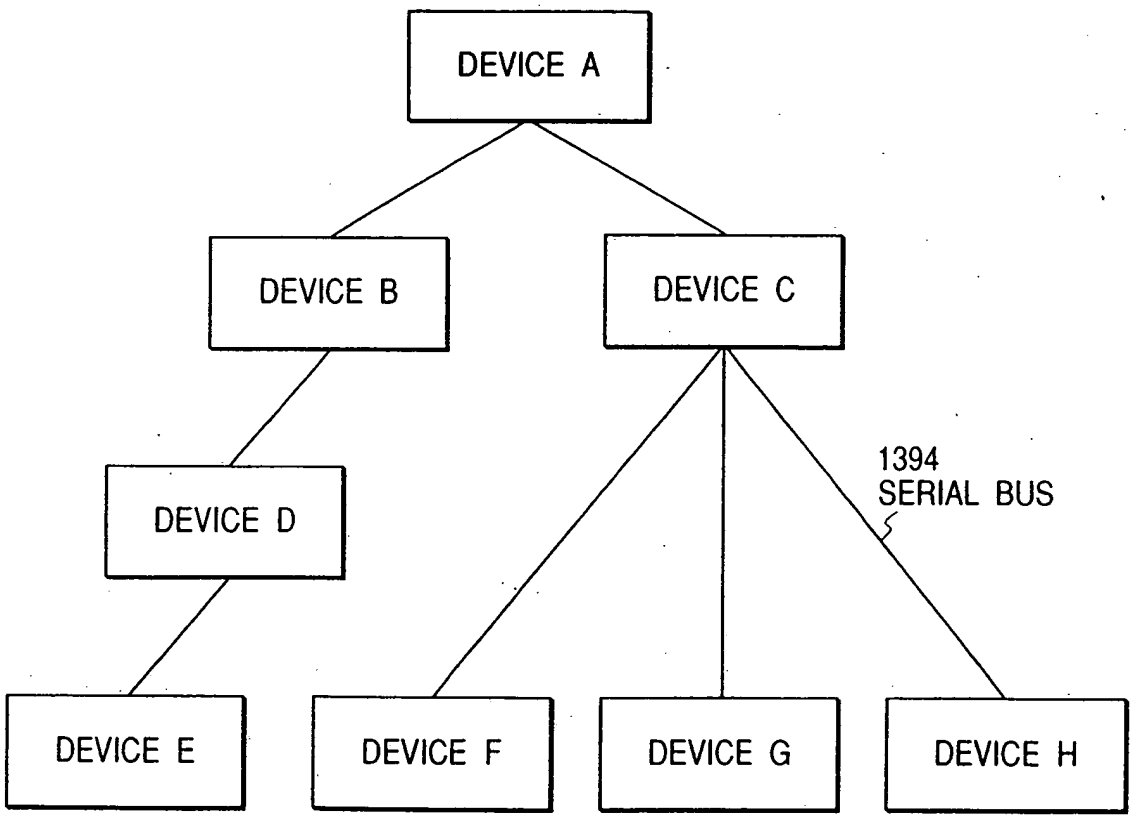

DEVICE A
DEVICE B
DEVICE C
DEVICE D
1394
SERIAL BUS
DEVICE E
DEVICE F
DEVICE G
DEVICE H

FIG. 4

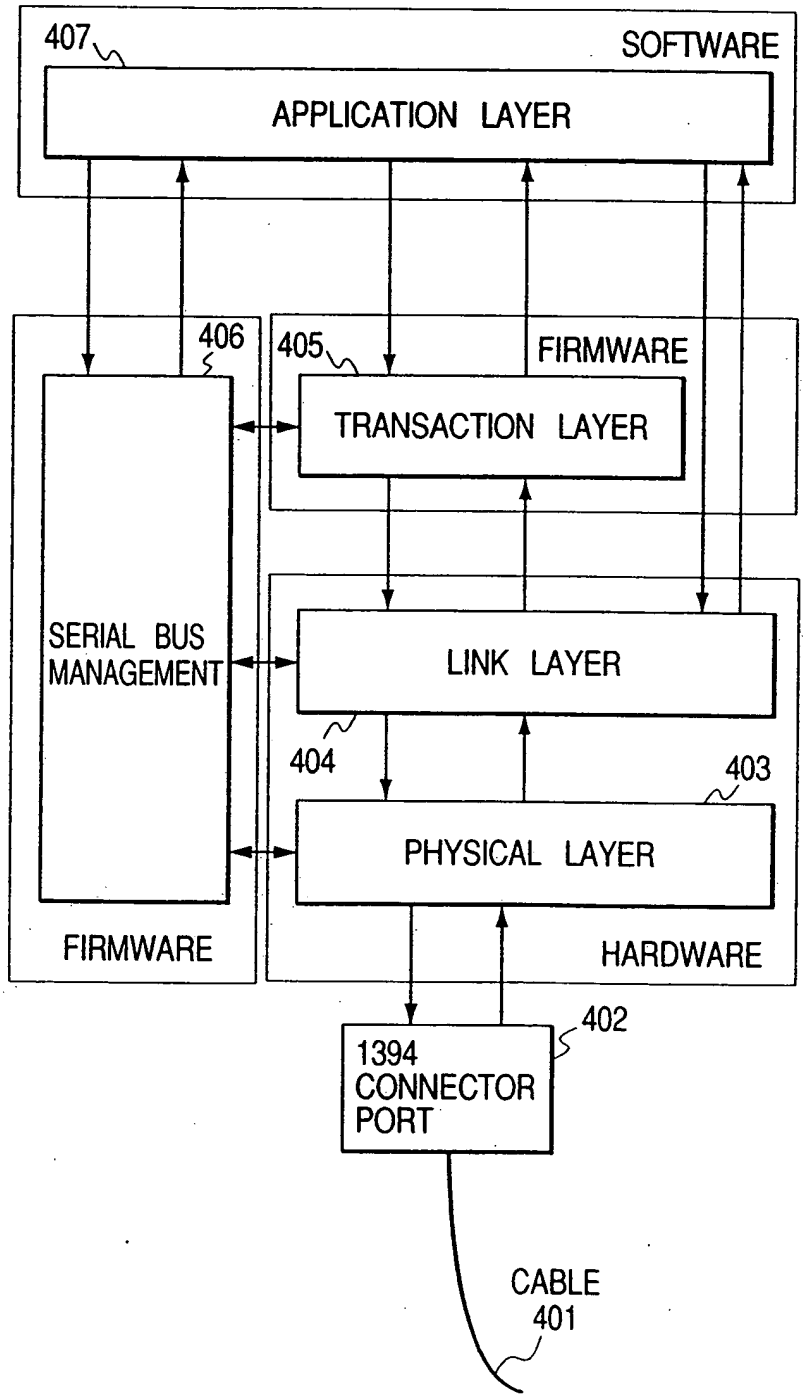

407
SOFTWARE
APPLICATION LAYER
406
405
FIRMWARE
TRANSACTION LAYER
SERIAL BUS MANAGEMENT
LINK LAYER
404
403
PHYSICAL LAYER
FIRMWARE
HARDWARE
402
1394 CONNECTOR PORT
CABLE 401

FIG. 5

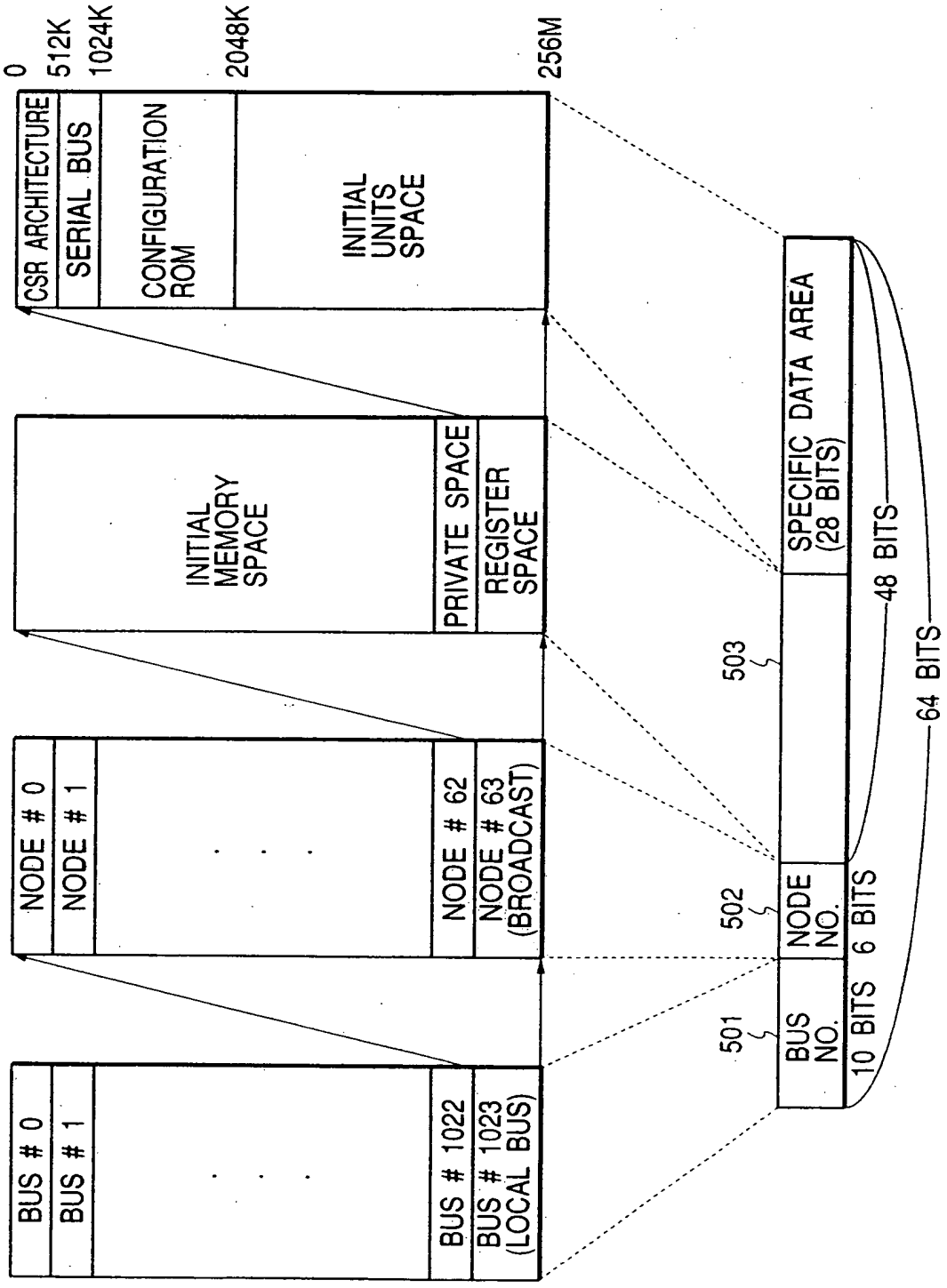

0
512K
1024K
2048K
256M
CSR ARCHITECTURE
SERIAL BUS
CONFIGURATION ROM
INITIAL UNITS SPACE
INITIAL MEMORY SPACE
PRIVATE SPACE
REGISTER SPACE
NODE # 0
NODE # 1
NODE # 62
NODE # 63 (BROADCAST)
BUS # 0
BUS # 1
BUS # 1022
BUS # 1023 (LOCAL BUS)
501
502
503
BUS NO.
NODE NO.
SPECIFIC DATA AREA (28 BITS)
10 BITS
6 BITS
48 BITS
64 BITS

FIG. 6

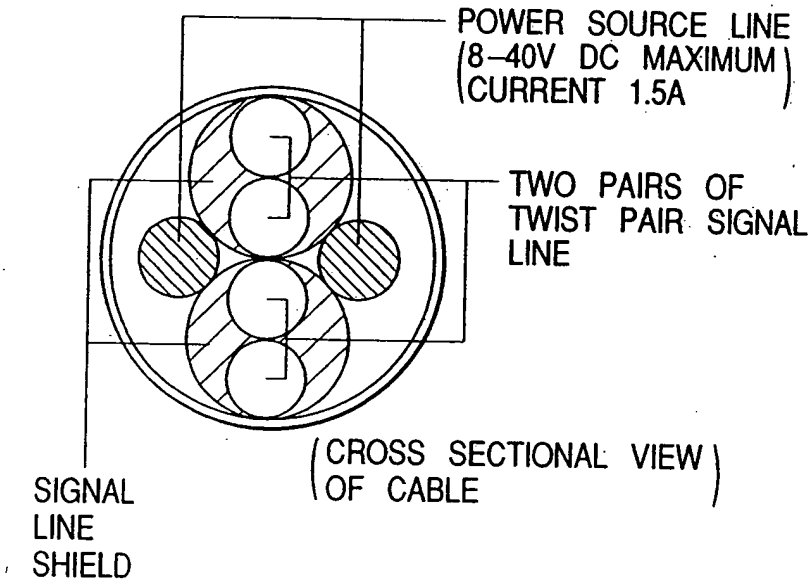

POWER SOURCE LINE
(8–40V DC MAXIMUM
CURRENT 1.5A)
TWO PAIRS OF
TWIST PAIR SIGNAL
LINE
(CROSS SECTIONAL VIEW
OF CABLE)
SIGNAL
LINE
SHIELD

FIG. 7

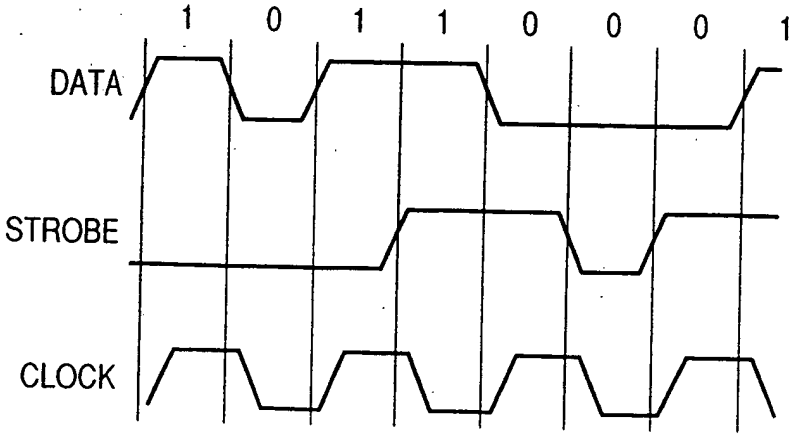

1 0 1 1 0 0 0 1
DATA
STROBE
CLOCK

FIG. 8

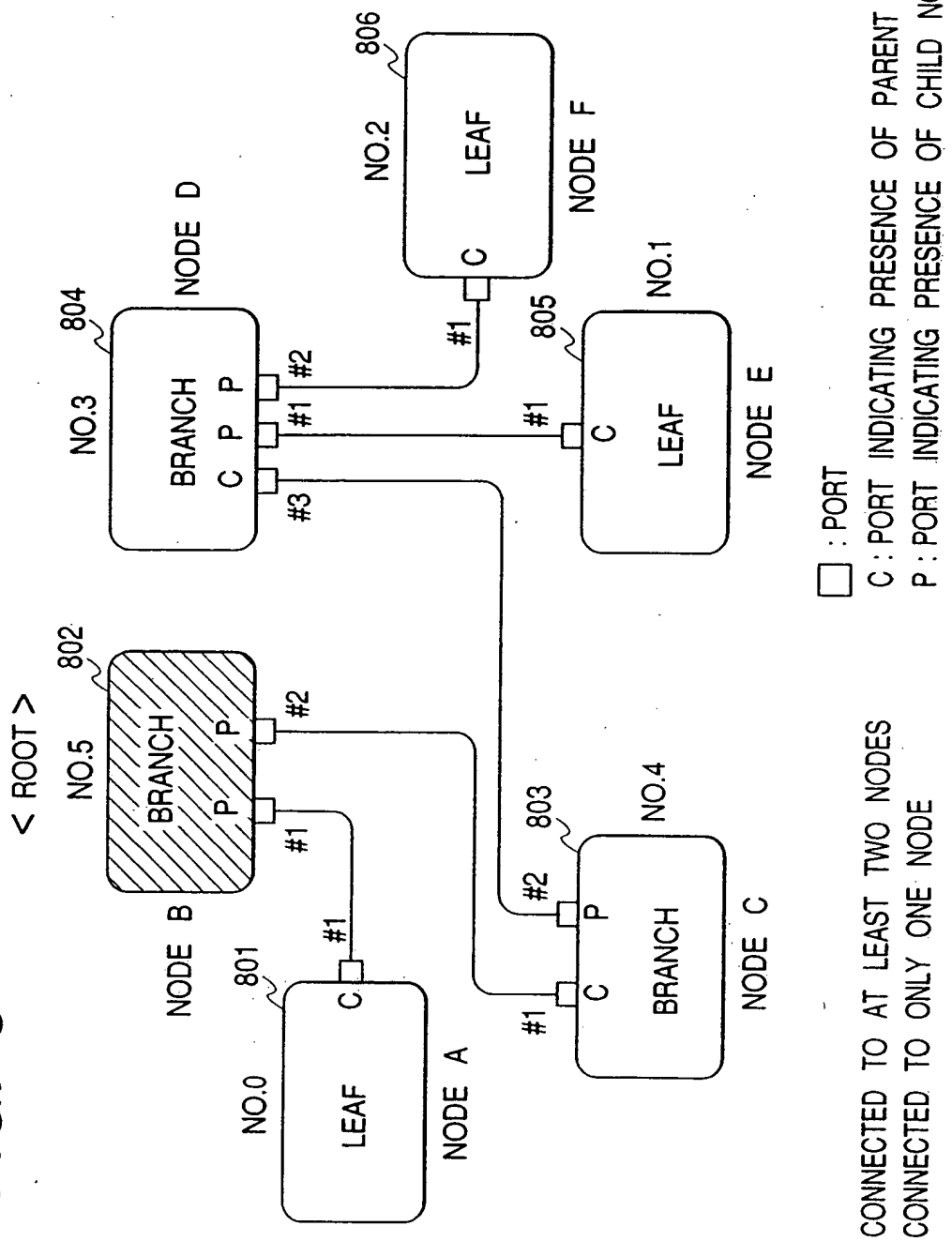

< ROOT >
802
NO.5
BRANCH
P
P
P
#1
#2
NODE B
801
NO.0
LEAF
C
#1
NODE A
804
NO.3
BRANCH
C P P
#1
#2
#3
NODE D
806
NO.2
LEAF
C
#1
NODE F
805
NO.1
LEAF
C
#1
NODE E
803
NO.4
BRANCH
C P
#1
#2
NODE C
□ : PORT
C : PORT INDICATING PRESENCE OF PARENT NODE
P : PORT INDICATING PRESENCE OF CHILD NODE
BRANCH : NODE CONNECTED TO AT LEAST TWO NODES
LEAF : NODE CONNECTED TO ONLY ONE NODE

FIG. 9

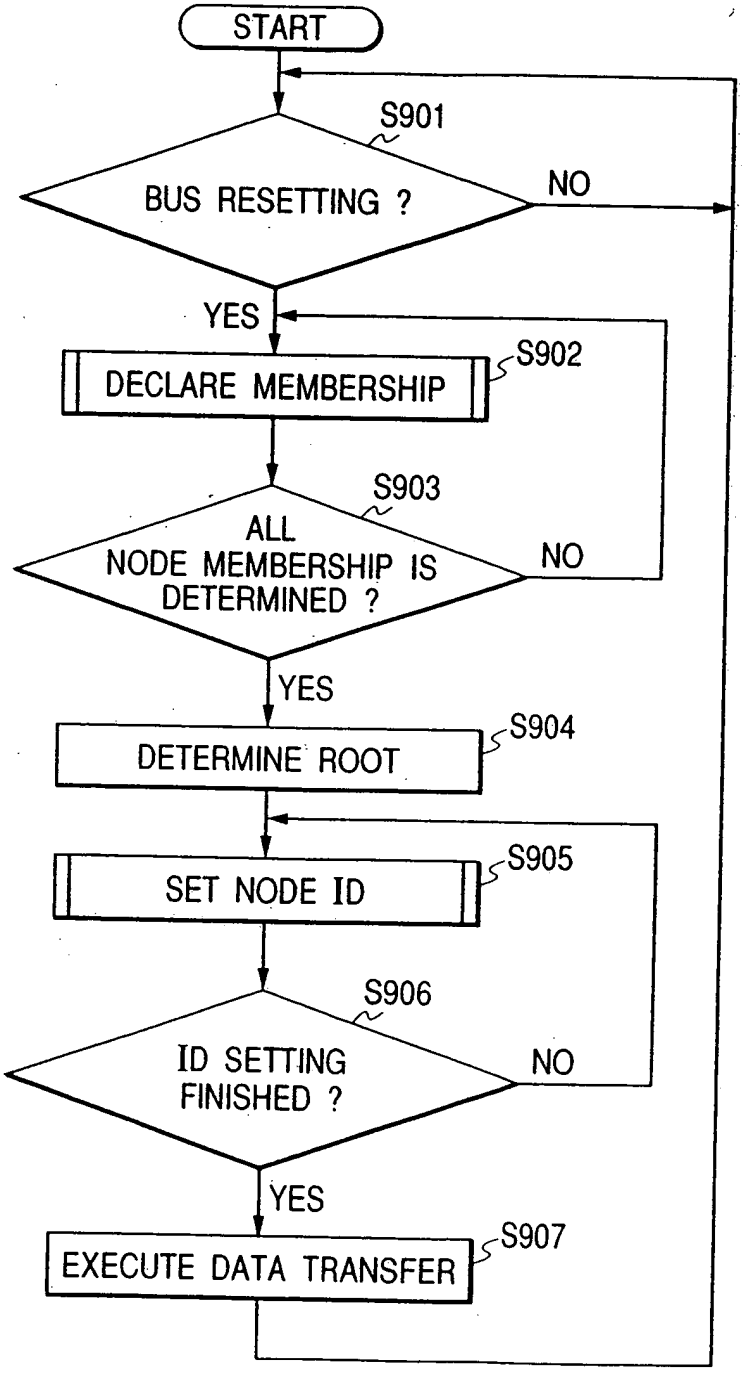

START
S901
BUS RESETTING ?
NO
YES
DECLARE MEMBERSHIP
S902
S903
ALL
NODE MEMBERSHIP IS
DETERMINED ?
NO
YES
DETERMINE ROOT
S904
SET NODE ID
S905
S906
ID SETTING
FINISHED ?
NO
YES
EXECUTE DATA TRANSFER
S907

FIG. 10

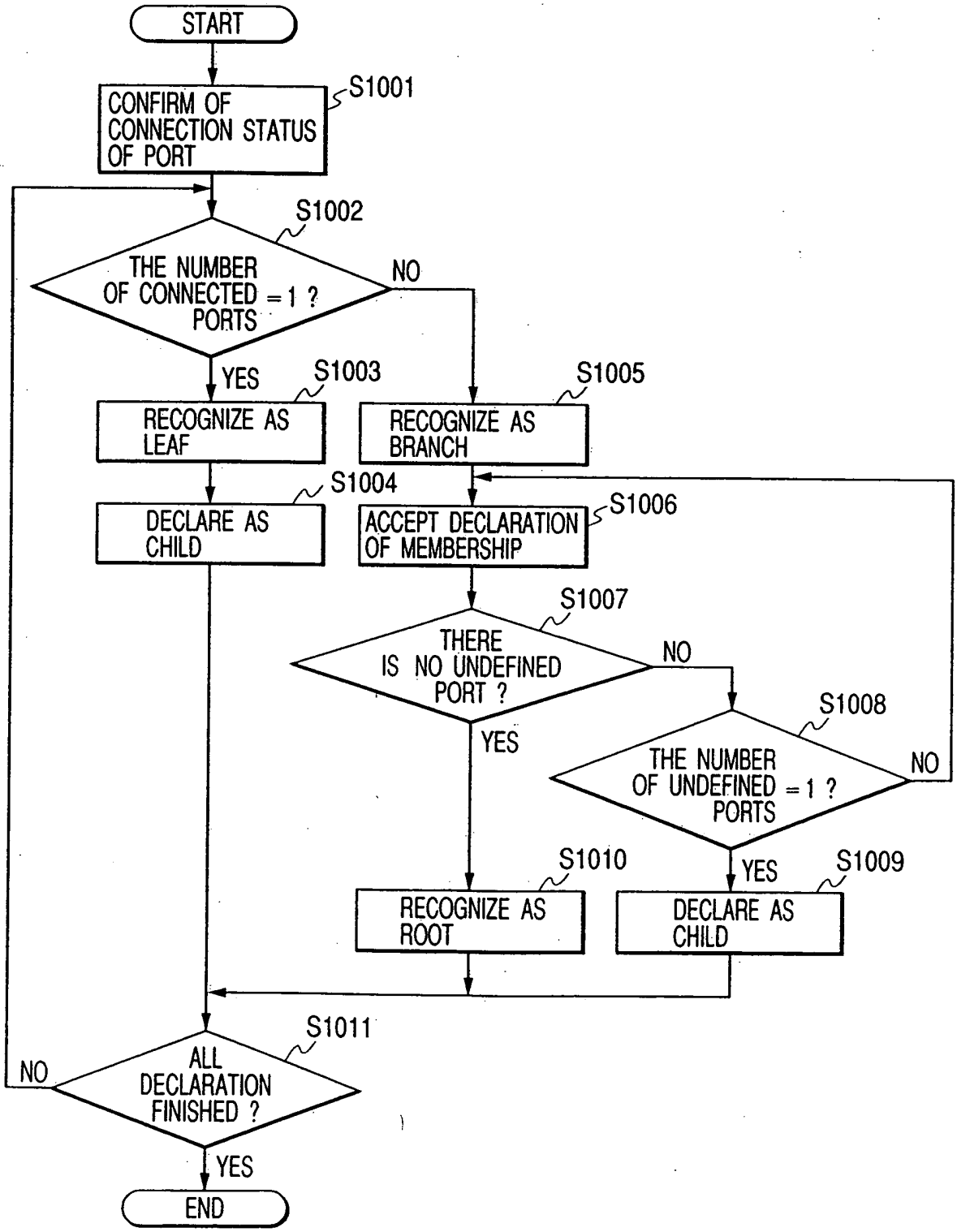

START
CONFIRM OF CONNECTION STATUS OF PORT
S1001
S1002
THE NUMBER OF CONNECTED PORTS = 1 ?
NO
YES
S1003
RECOGNIZE AS LEAF
S1005
RECOGNIZE AS BRANCH
S1004
DECLARE AS CHILD
S1006
ACCEPT DECLARATION OF MEMBERSHIP
S1007
THERE IS NO UNDEFINED PORT ?
NO
YES
S1008
THE NUMBER OF UNDEFINED PORTS = 1 ?
NO
YES
S1010
RECOGNIZE AS ROOT
S1009
DECLARE AS CHILD
S1011
ALL DECLARATION FINISHED ?
NO
YES
END

FIG. 11

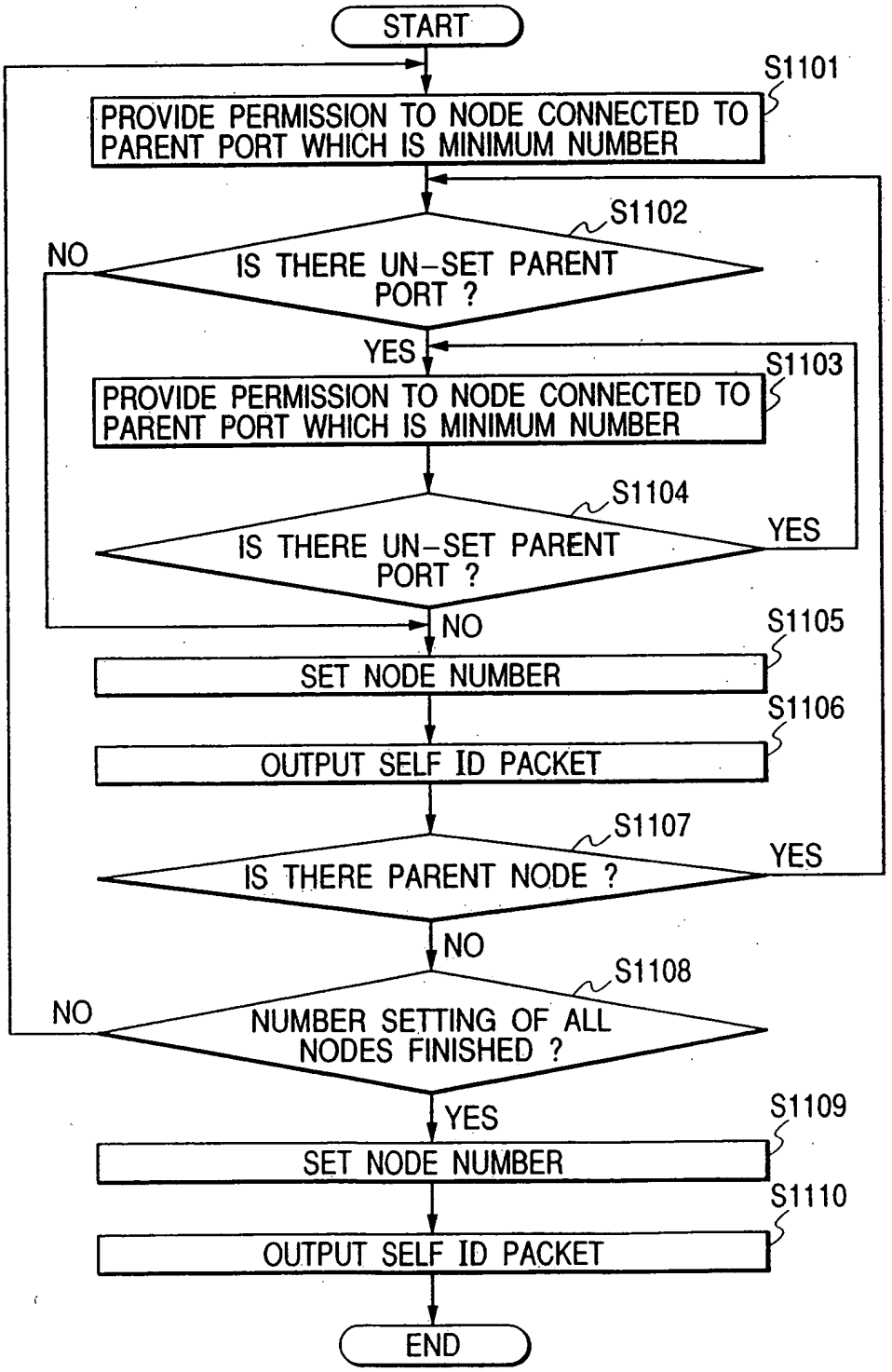

START
S1101
PROVIDE PERMISSION TO NODE CONNECTED TO PARENT PORT WHICH IS MINIMUM NUMBER
S1102
IS THERE UN-SET PARENT PORT ?
NO
YES
S1103
PROVIDE PERMISSION TO NODE CONNECTED TO PARENT PORT WHICH IS MINIMUM NUMBER
S1104
IS THERE UN-SET PARENT PORT ?
YES
NO
S1105
SET NODE NUMBER
S1106
OUTPUT SELF ID PACKET
S1107
IS THERE PARENT NODE ?
YES
NO
S1108
NUMBER SETTING OF ALL NODES FINISHED ?
NO
YES
S1109
SET NODE NUMBER
S1110
OUTPUT SELF ID PACKET
END

FIG. 12A

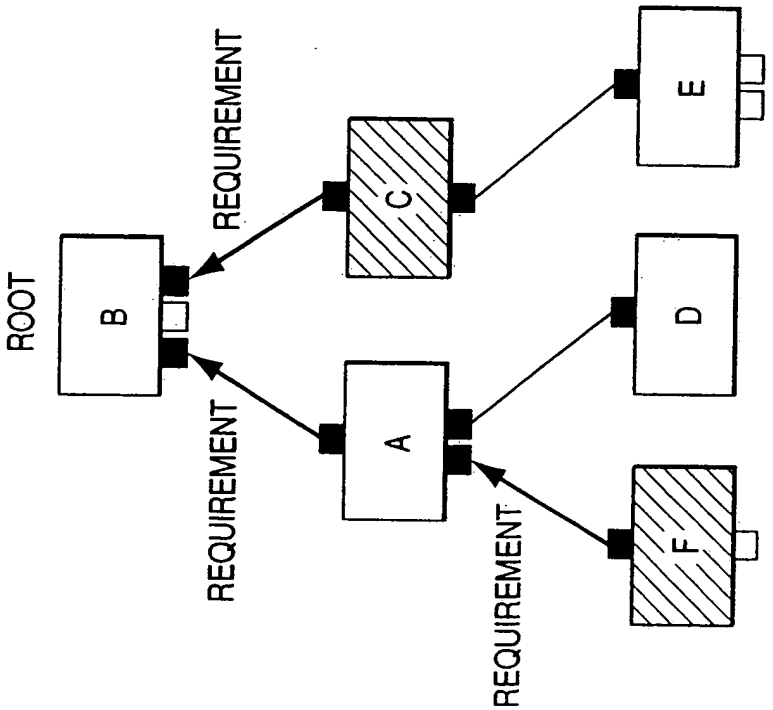


FIG. 12B

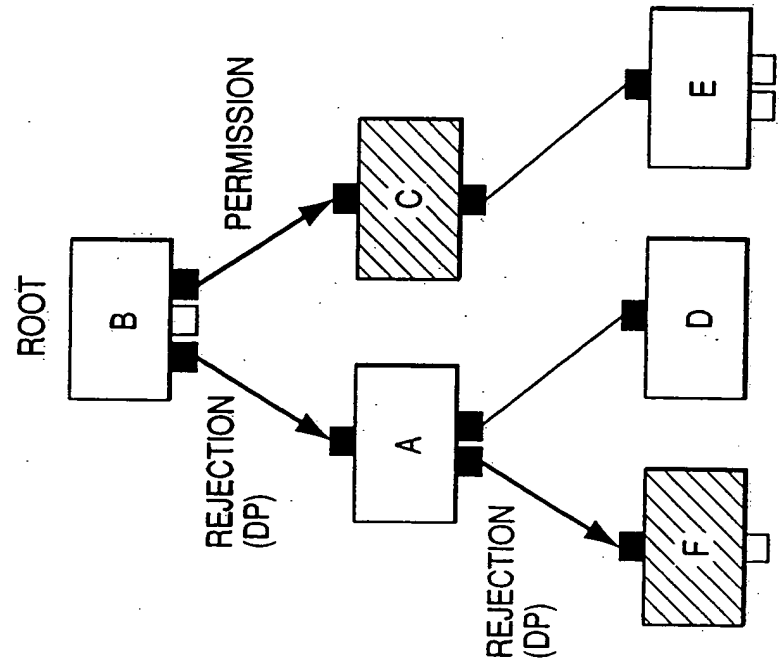


FIG. 13

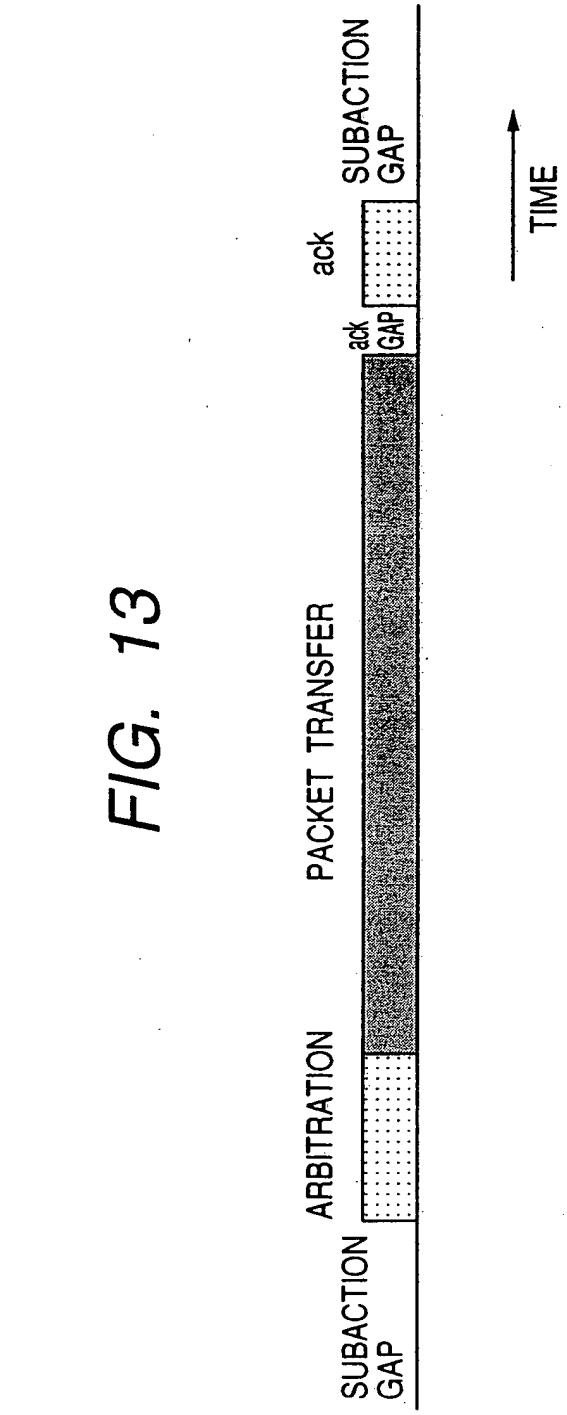

SUBACTION GAP
ARBITRATION
PACKET TRANSFER
ack GAP
ack
SUBACTION GAP
TIME

FIG. 14

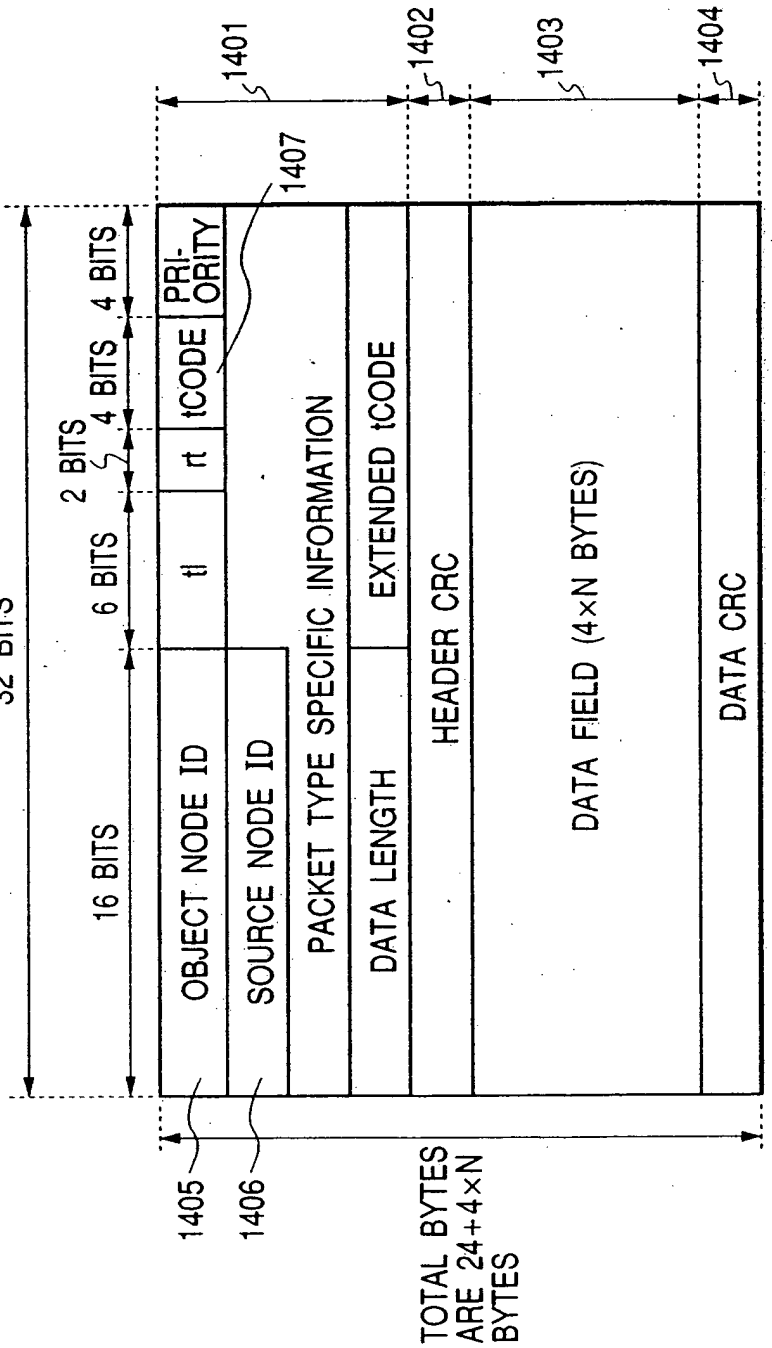

32 BITS
16 BITS
6 BITS
2 BITS
4 BITS
4 BITS
4 BITS
OBJECT NODE ID
tl
rt
tCODE
PRI-ORITY
SOURCE NODE ID
PACKET TYPE SPECIFIC INFORMATION
DATA LENGTH
EXTENDED tCODE
HEADER CRC
DATA FIELD (4×N BYTES)
DATA CRC
1401
1402
1403
1404
1405
1406
1407
TOTAL BYTES ARE 24+4×N BYTES

FIG. 15

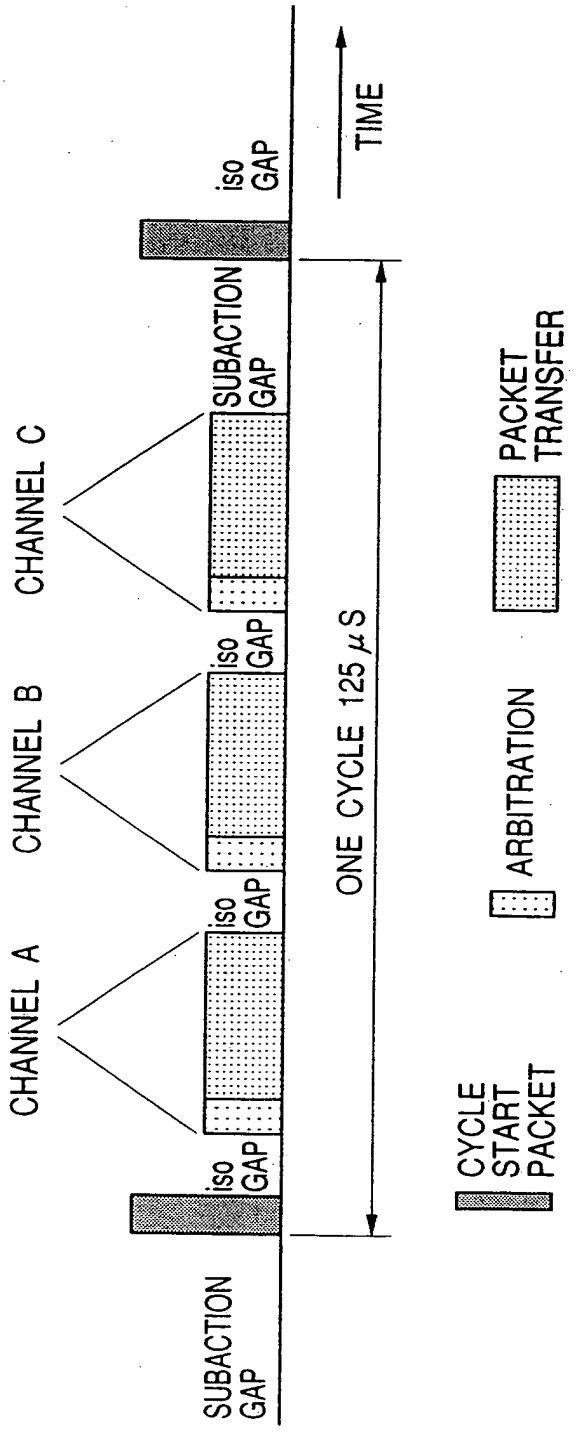

CHANNEL A
CHANNEL B
CHANNEL C
SUBACTION GAP
iso GAP
ONE CYCLE 125 μS
SUBACTION GAP
iso GAP
TIME
CYCLE START PACKET
ARBITRATION
PACKET TRANSFER
iso GAP : ISOCHRONOUS GAP

FIG. 16

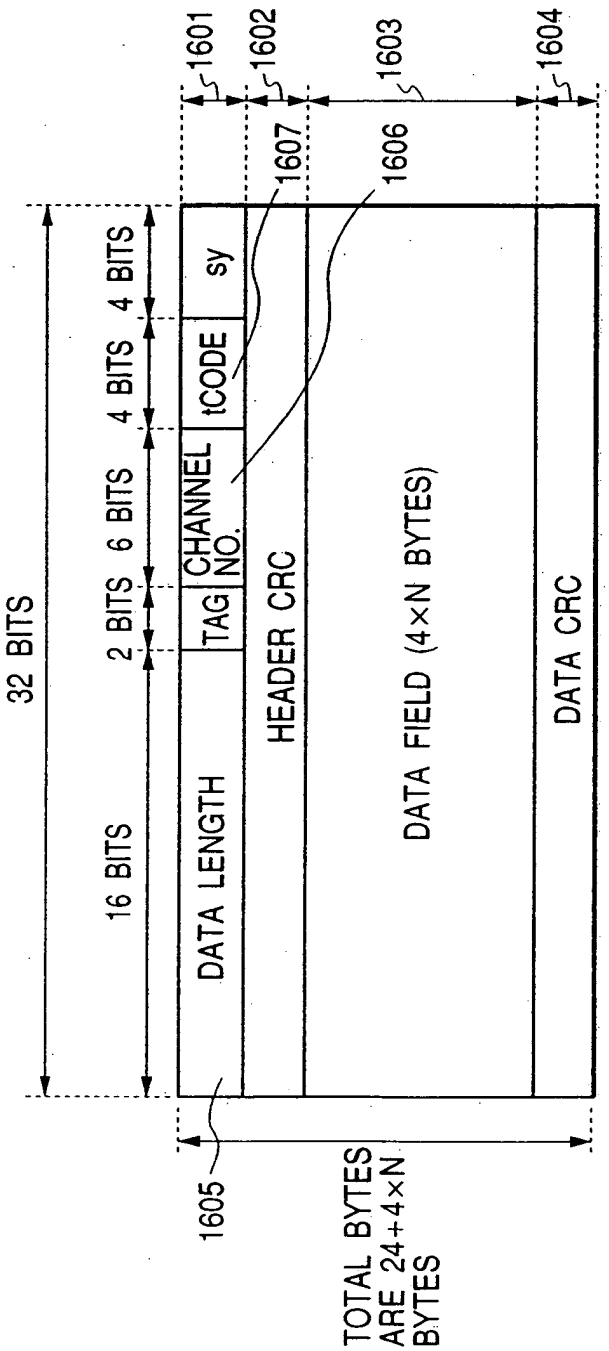

1601
1602
1603
1604
1607
1606
32 BITS
16 BITS
2 BITS
6 BITS
4 BITS
4 BITS
4 BITS
TAG
CHANNEL NO.
tCODE
sy
DATA LENGTH
HEADER CRC
DATA FIELD (4×N BYTES)
DATA CRC
1605
TOTAL BYTES ARE 24+4×N BYTES

FIG. 17

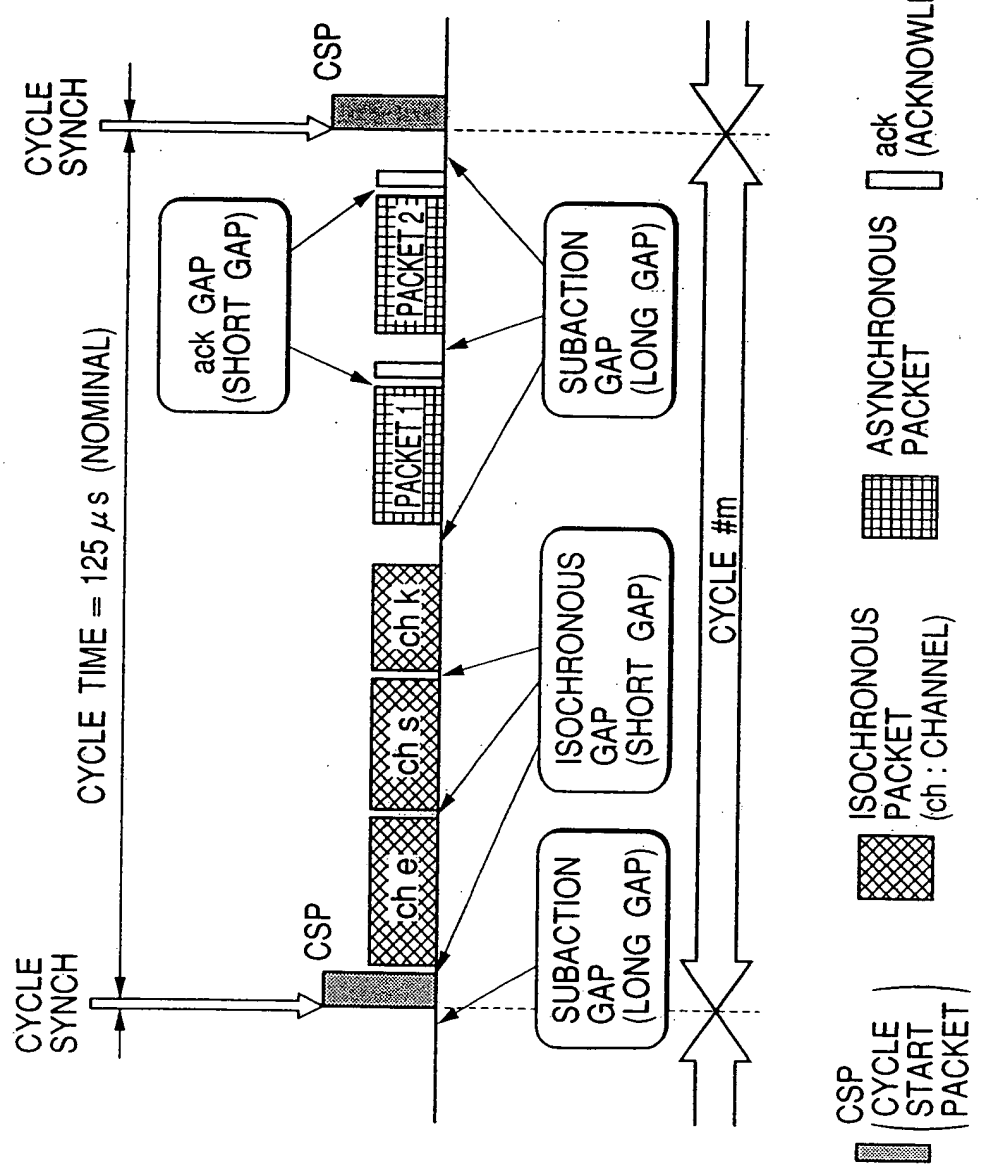

CYCLE SYNCH
CYCLE TIME = 125 μs (NOMINAL)
CSP
ack GAP (SHORT GAP)
PACKET 2
PACKET 1
SUBACTION GAP (LONG GAP)
ch k
ch s
ch e
ISOCHRONOUS GAP (SHORT GAP)
SUBACTION GAP (LONG GAP)
CYCLE #m
CSP (CYCLE START PACKET)
ISOCHRONOUS PACKET (ch : CHANNEL)
ASYNCHRONOUS PACKET
ack (ACKNOWLEDGMENT)

FIG. 18

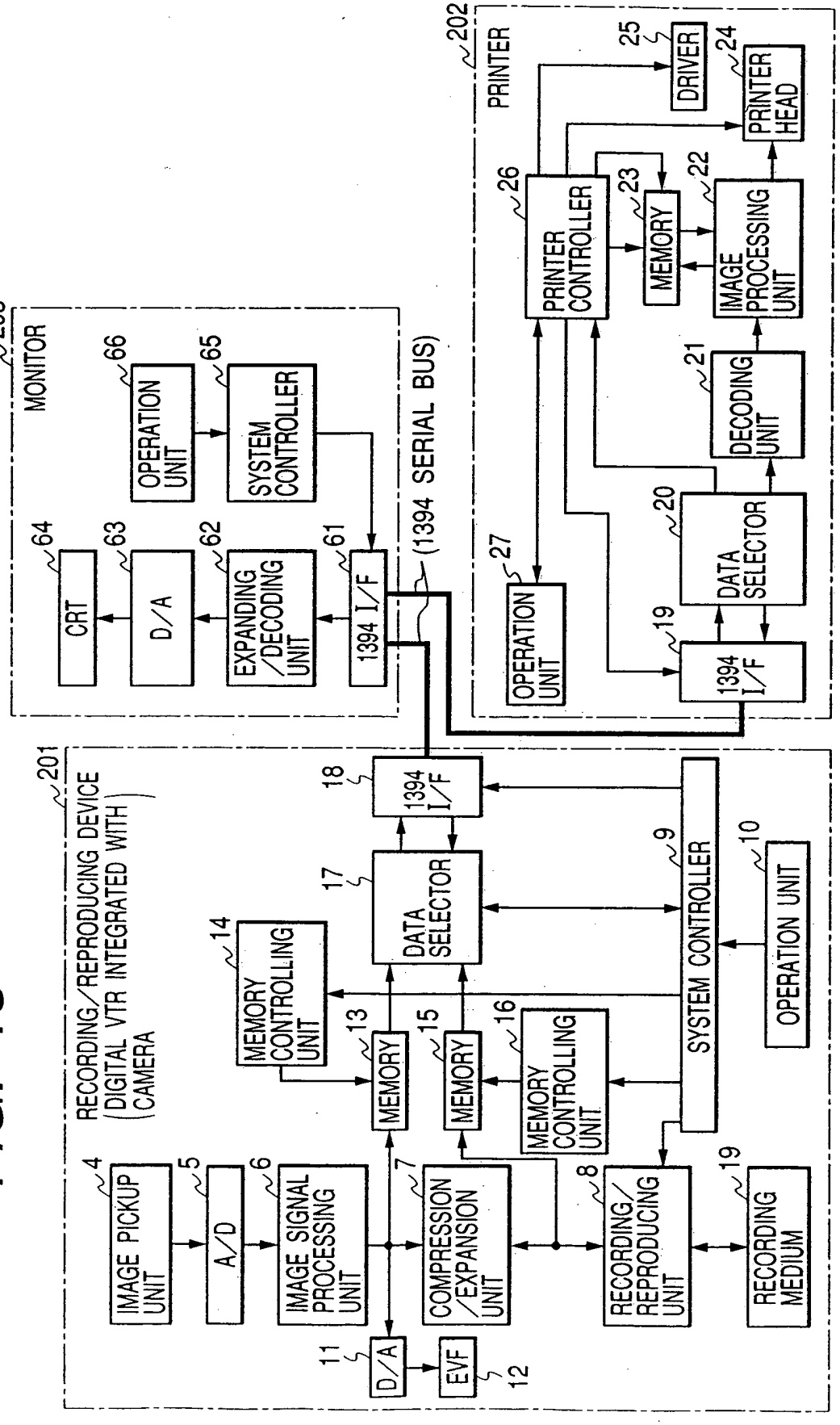

201
RECORDING/REPRODUCING DEVICE
(DIGITAL VTR INTEGRATED WITH CAMERA)
4
IMAGE PICKUP UNIT
5
A/D
6
IMAGE SIGNAL PROCESSING UNIT
7
COMPRESSION /EXPANSION UNIT
8
RECORDING/ REPRODUCING UNIT
19
RECORDING MEDIUM
11
D/A
12
EVF
13
MEMORY
14
MEMORY CONTROLLING UNIT
15
MEMORY
16
MEMORY CONTROLLING UNIT
17
DATA SELECTOR
18
1394 I/F
9
SYSTEM CONTROLLER
10
OPERATION UNIT
(1394 SERIAL BUS)
203
MONITOR
64
CRT
63
D/A
62
EXPANDING /DECODING UNIT
61
1394 I/F
66
OPERATION UNIT
65
SYSTEM CONTROLLER
202
PRINTER
25
DRIVER
24
PRINTER HEAD
26
PRINTER CONTROLLER
23
MEMORY
22
IMAGE PROCESSING UNIT
21
DECODING UNIT
20
DATA SELECTOR
19
1394 I/F
27
OPERATION UNIT

FIG. 19

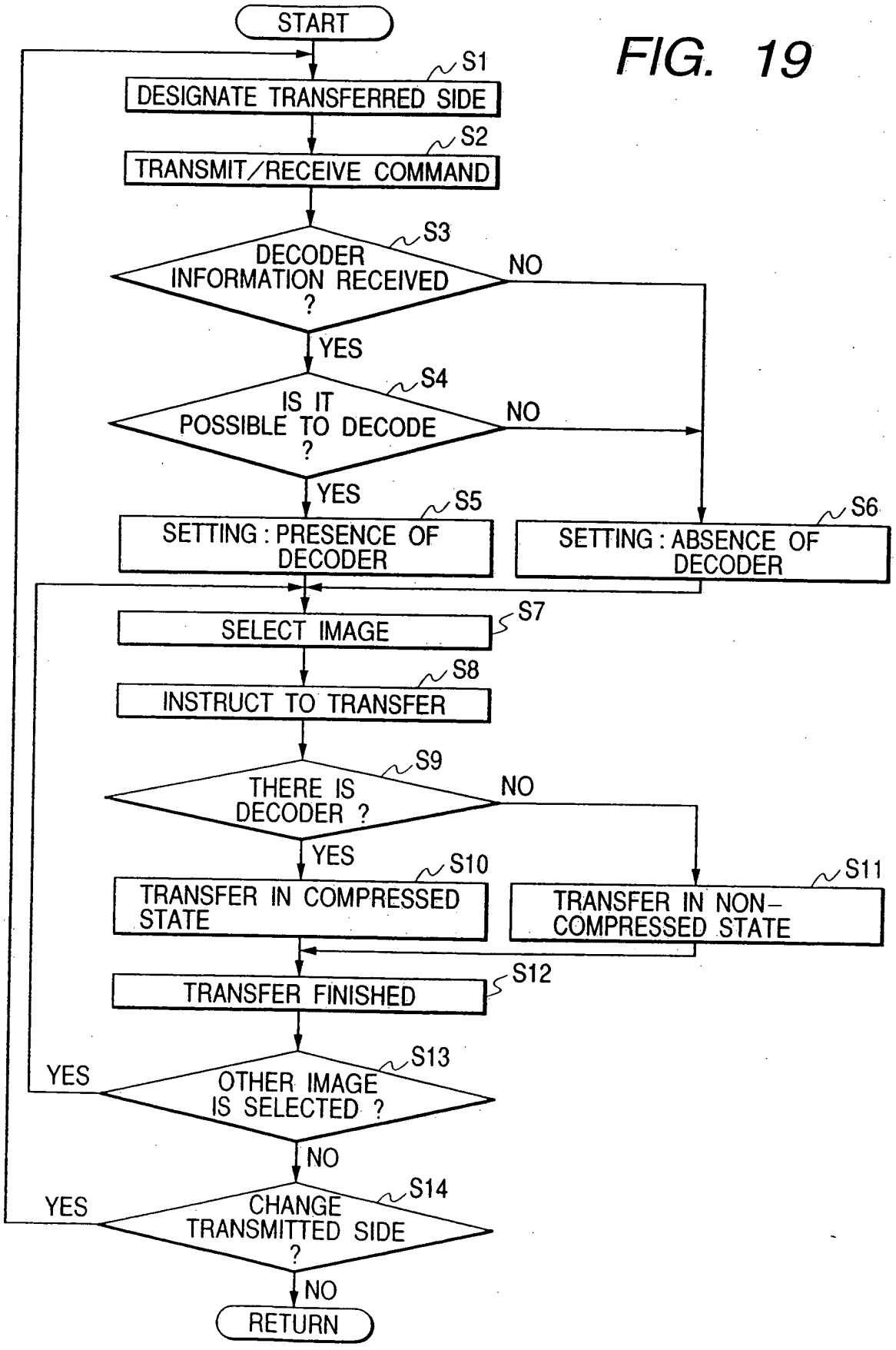

START
S1
DESIGNATE TRANSFERRED SIDE
S2
TRANSMIT/RECEIVE COMMAND
S3
DECODER INFORMATION RECEIVED ?
NO
YES
S4
IS IT POSSIBLE TO DECODE ?
NO
YES
S5
SETTING : PRESENCE OF DECODER
S6
SETTING : ABSENCE OF DECODER
S7
SELECT IMAGE
S8
INSTRUCT TO TRANSFER
S9
THERE IS DECODER ?
NO
YES
S10
TRANSFER IN COMPRESSED STATE
S11
TRANSFER IN NON-COMPRESSED STATE
S12
TRANSFER FINISHED
S13
OTHER IMAGE IS SELECTED ?
YES
NO
S14
CHANGE TRANSMITTED SIDE ?
YES
NO
RETURN

FIG. 20

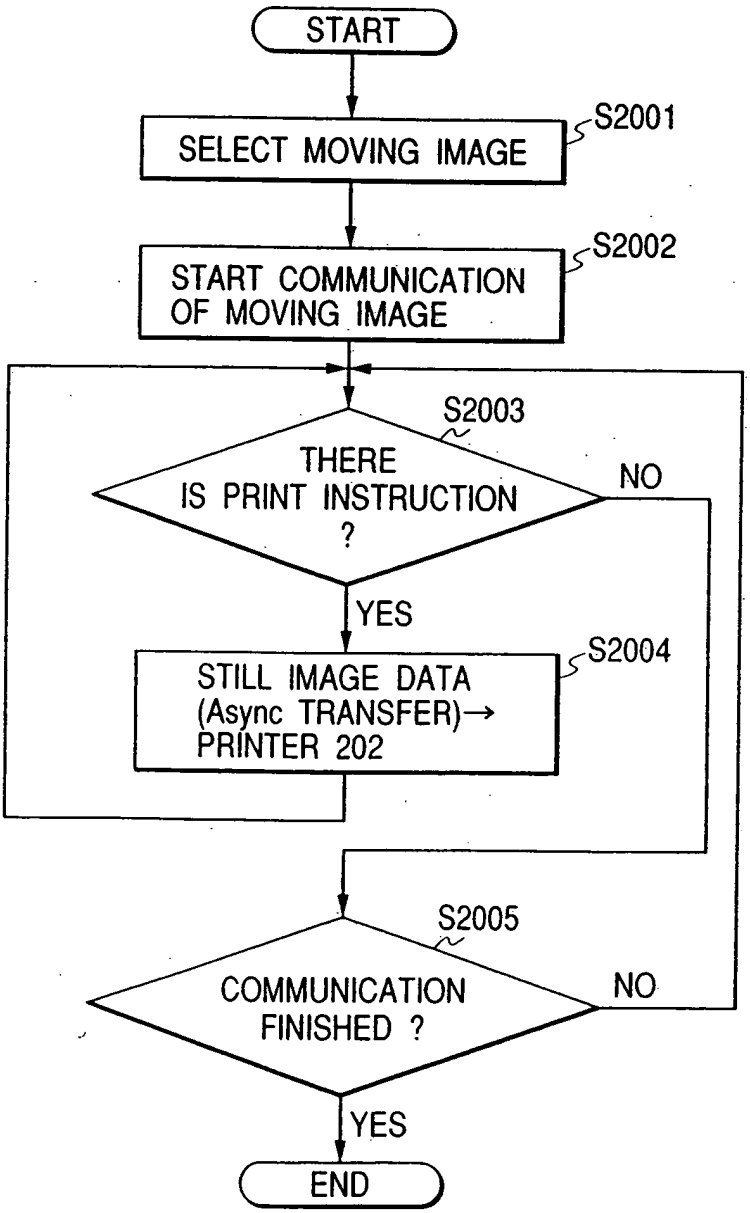

START
SELECT MOVING IMAGE
S2001
START COMMUNICATION OF MOVING IMAGE
S2002
S2003
THERE IS PRINT INSTRUCTION ?
NO
YES
STILL IMAGE DATA (Async TRANSFER)→ PRINTER 202
S2004
S2005
COMMUNICATION FINISHED ?
NO
YES
END

FIG. 21

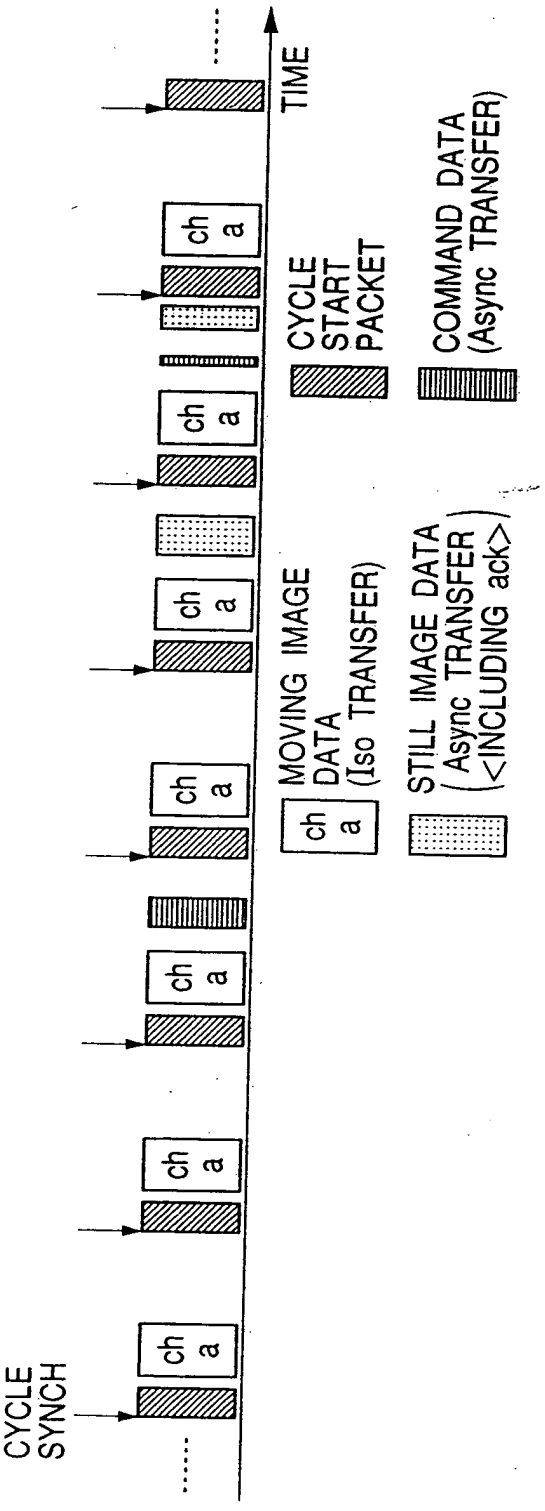

CYCLE SYNCH
ch a
TIME
CYCLE START PACKET
COMMAND DATA (Async TRANSFER)
MOVING IMAGE DATA (Iso TRANSFER)
STILL IMAGE DATA (Async TRANSFER <INCLUDING ack>)

FIG. 22

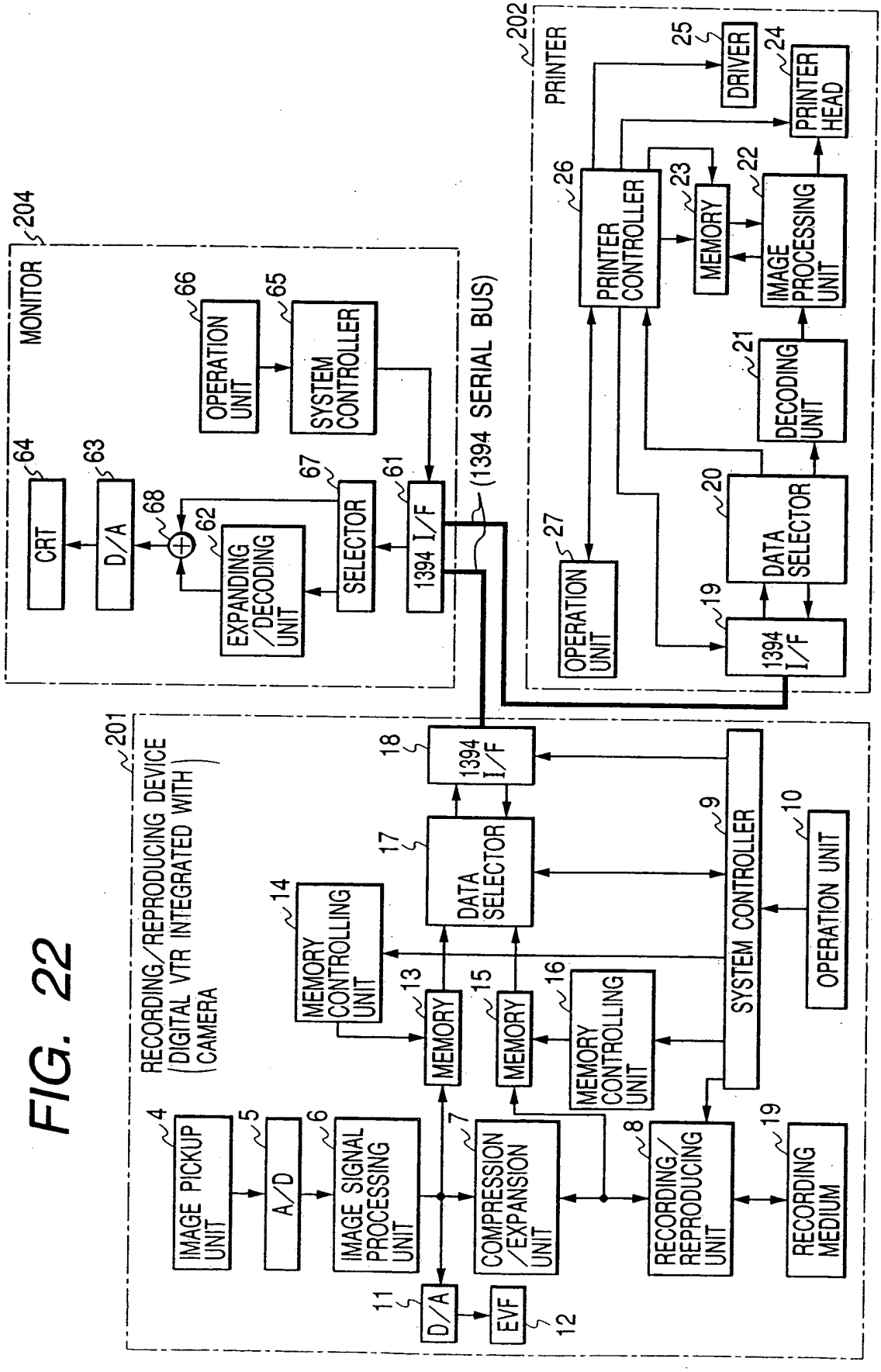

201
RECORDING/REPRODUCING DEVICE
(DIGITAL VTR INTEGRATED WITH CAMERA)
4
IMAGE PICKUP UNIT
5
A/D
6
IMAGE SIGNAL PROCESSING UNIT
7
COMPRESSION /EXPANSION UNIT
8
RECORDING/ REPRODUCING UNIT
19
RECORDING MEDIUM
11
D/A
12
EVF
13
MEMORY
14
MEMORY CONTROLLING UNIT
15
MEMORY
16
MEMORY CONTROLLING UNIT
17
DATA SELECTOR
18
1394 I/F
9
SYSTEM CONTROLLER
10
OPERATION UNIT
(1394 SERIAL BUS)
204
MONITOR
64
CRT
63
D/A
68
62
EXPANDING /DECODING UNIT
67
SELECTOR
61
1394 I/F
66
OPERATION UNIT
65
SYSTEM CONTROLLER
202
PRINTER
25
DRIVER
24
PRINTER HEAD
26
PRINTER CONTROLLER
23
MEMORY
22
IMAGE PROCESSING UNIT
21
DECODING UNIT
20
DATA SELECTOR
19
1394 I/F
27
OPERATION UNIT

FIG. 23

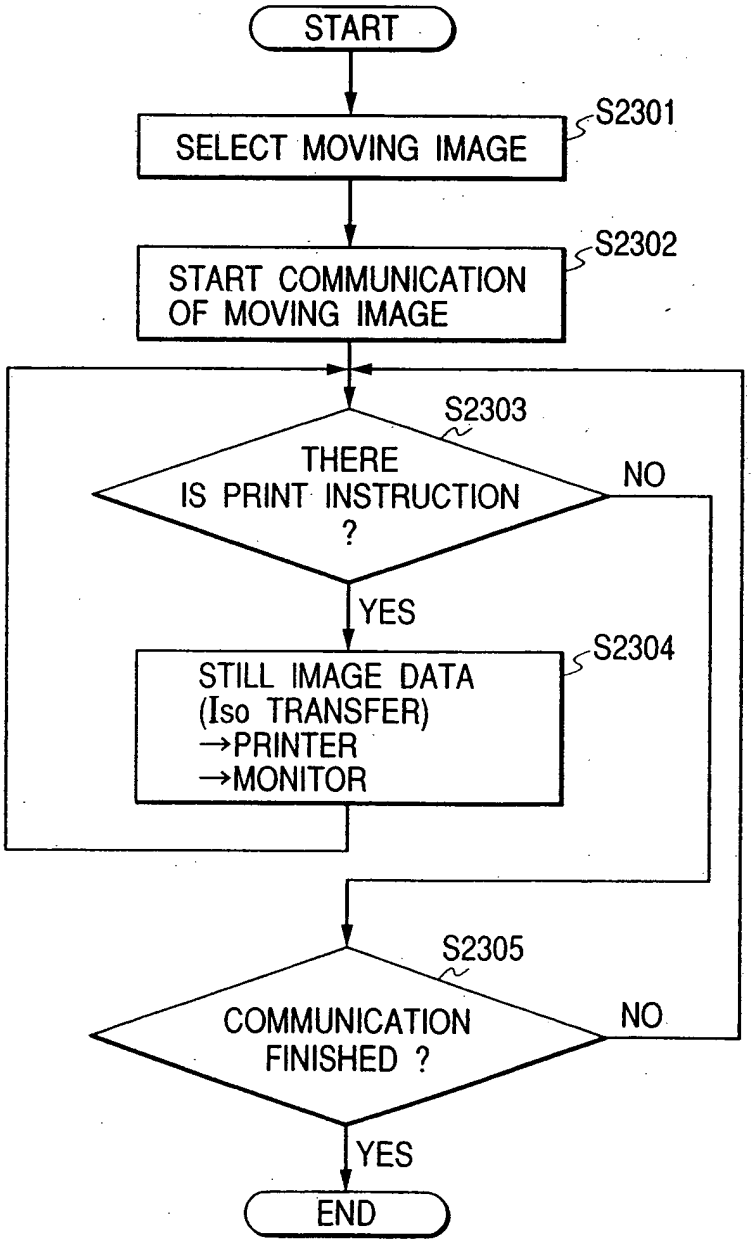

START
SELECT MOVING IMAGE
S2301
START COMMUNICATION OF MOVING IMAGE
S2302
S2303
THERE IS PRINT INSTRUCTION ?
NO
YES
STILL IMAGE DATA (Iso TRANSFER) →PRINTER →MONITOR
S2304
S2305
COMMUNICATION FINISHED ?
NO
YES
END

FIG. 24

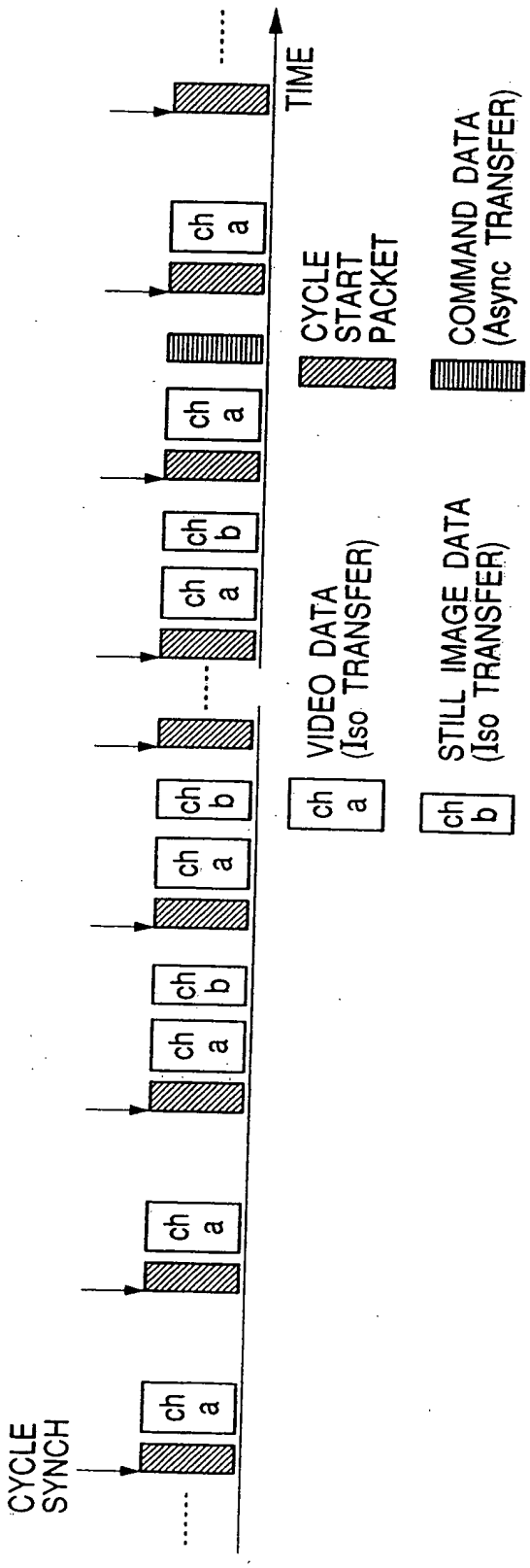

CYCLE SYNCH
TIME
ch a
ch b
CYCLE START PACKET
COMMAND DATA (Async TRANSFER)
VIDEO DATA (Iso TRANSFER)
STILL IMAGE DATA (Iso TRANSFER)

FIG. 25

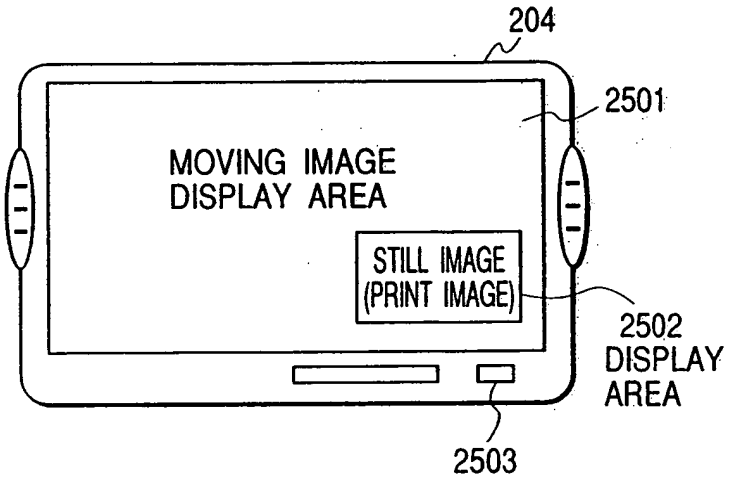

204
2501
MOVING IMAGE
DISPLAY AREA
STILL IMAGE
(PRINT IMAGE)
2502
DISPLAY
AREA
2503

FIG. 26

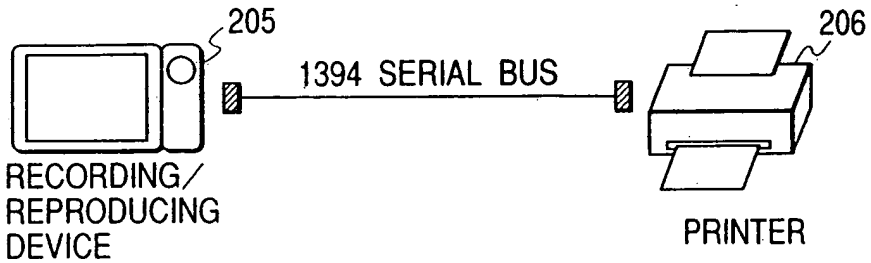

205
1394 SERIAL BUS
206
RECORDING/
REPRODUCING
DEVICE
PRINTER

FIG. 27

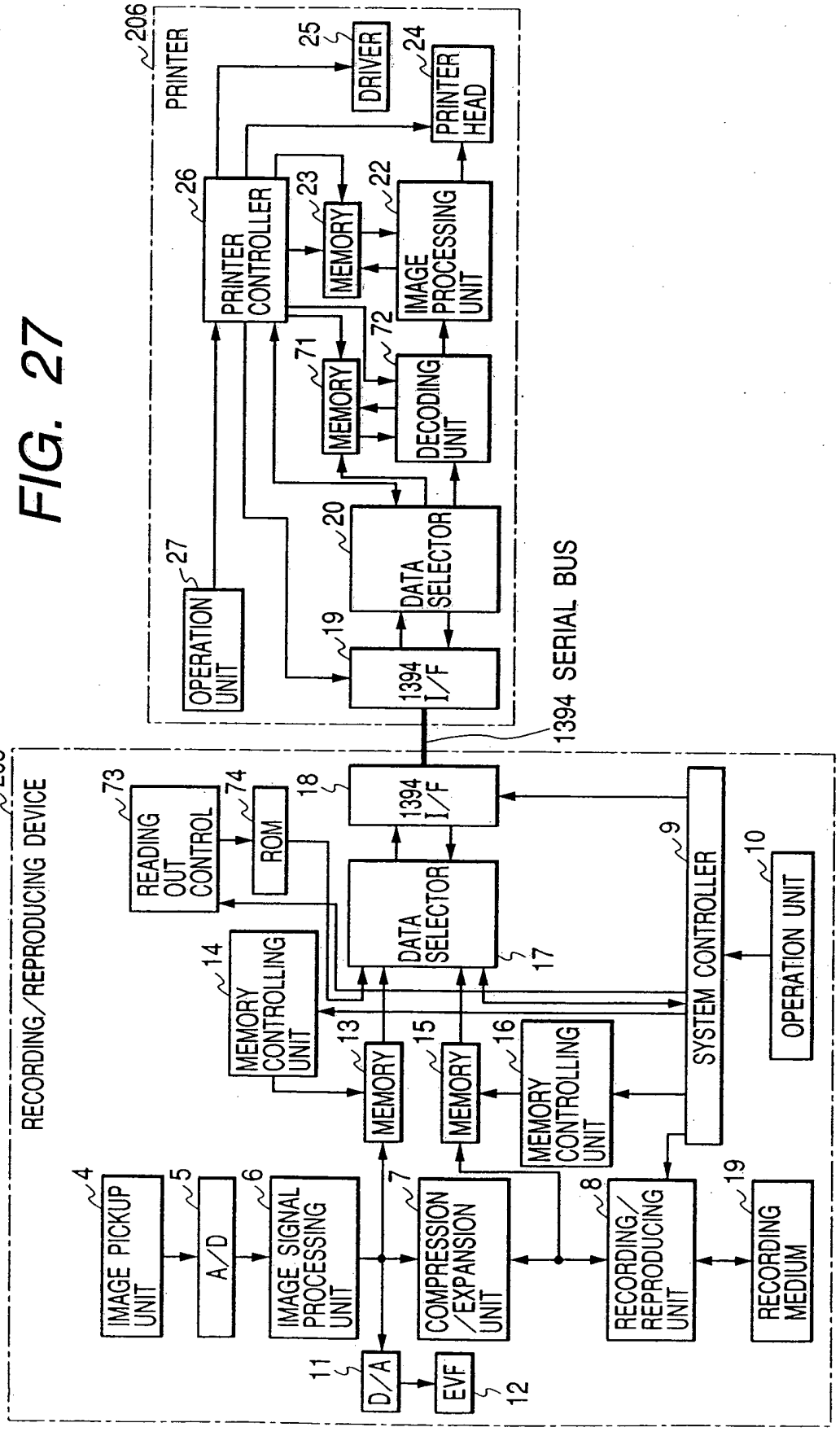

205
RECORDING/REPRODUCING DEVICE
206
PRINTER
1394 SERIAL BUS
IMAGE PICKUP UNIT
A/D
IMAGE SIGNAL PROCESSING UNIT
COMPRESSION /EXPANSION UNIT
RECORDING/ REPRODUCING UNIT
RECORDING MEDIUM
D/A
EVF
MEMORY
MEMORY CONTROLLING UNIT
DATA SELECTOR
1394 I/F
READING OUT CONTROL
ROM
SYSTEM CONTROLLER
OPERATION UNIT
PRINTER CONTROLLER
DRIVER
PRINTER HEAD
IMAGE PROCESSING UNIT
DECODING UNIT
OPERATION UNIT

FIG. 28

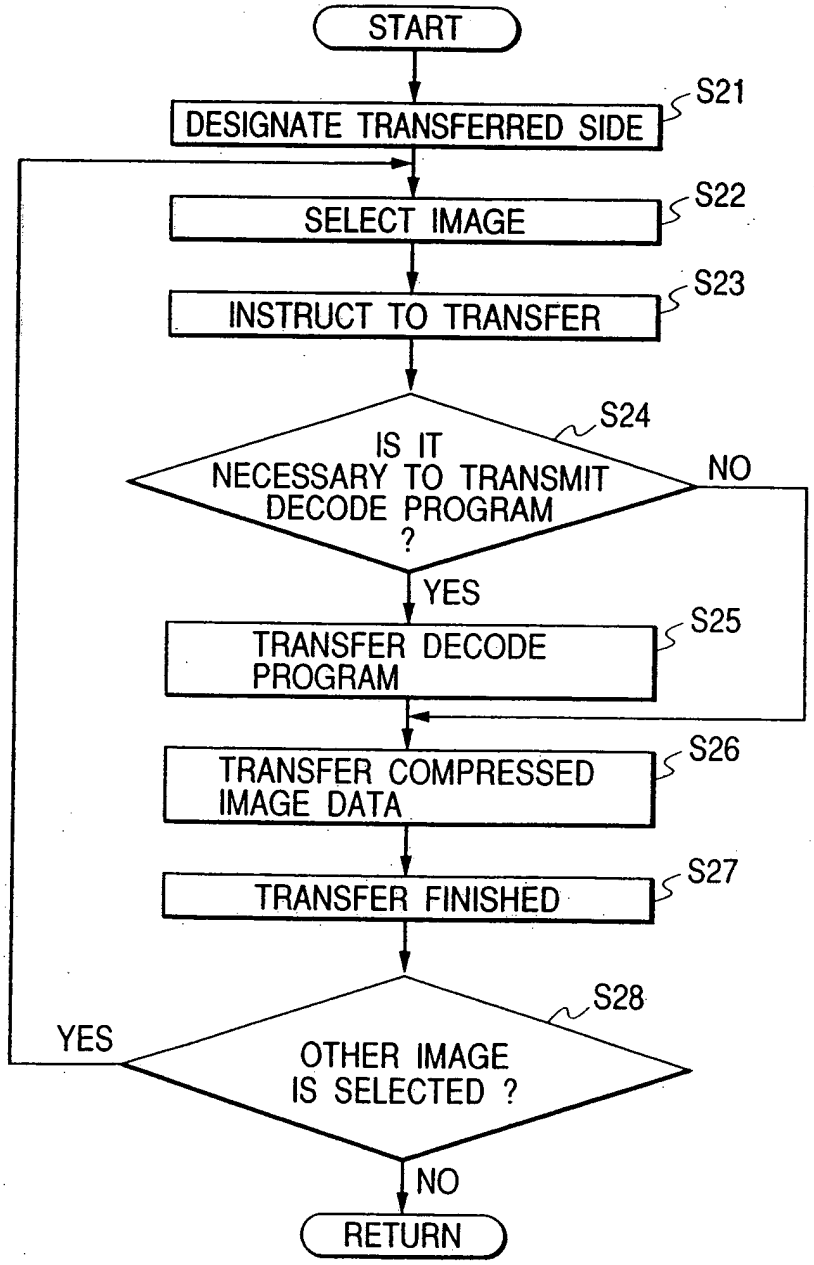
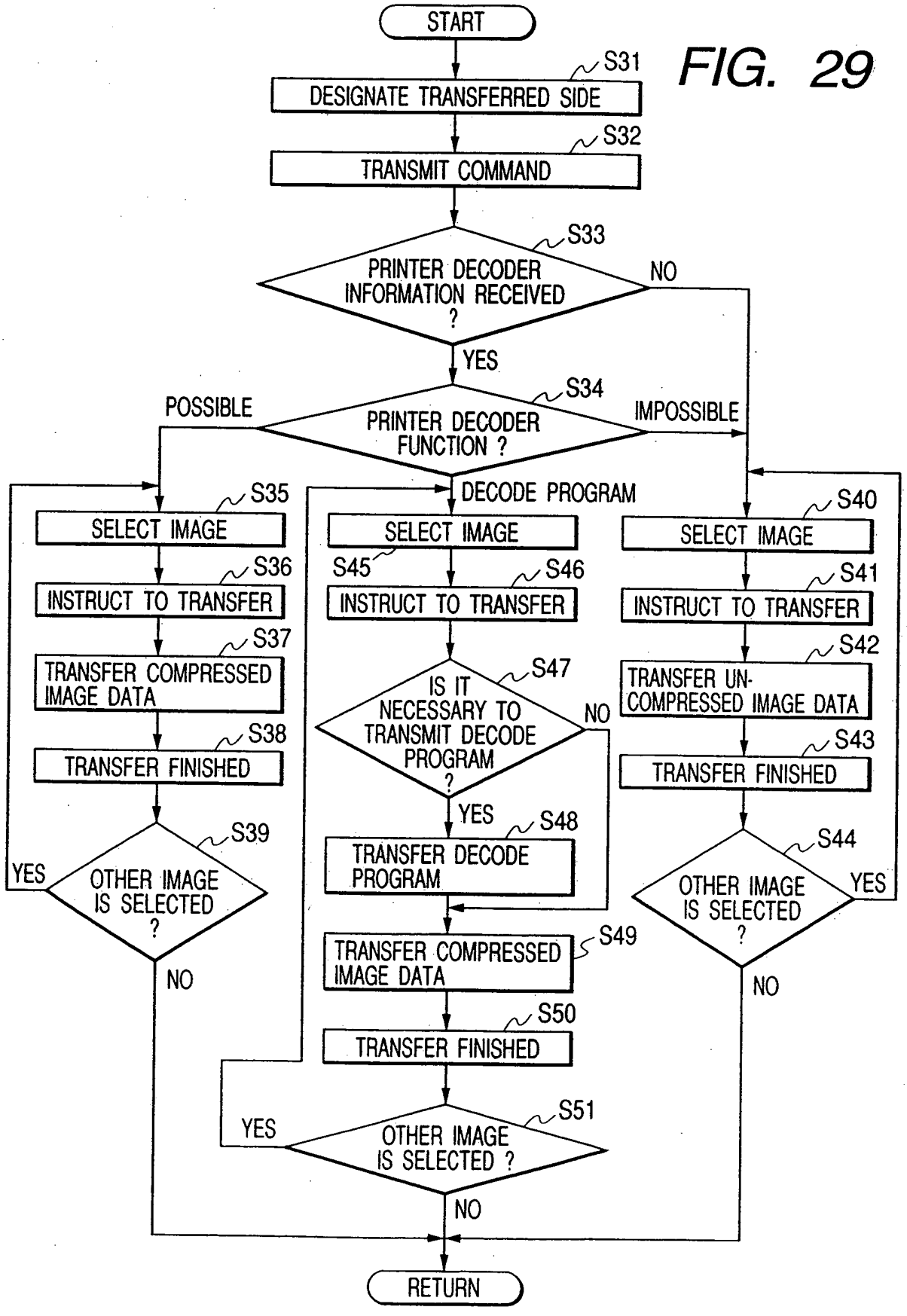

START
DESIGNATE TRANSFERRED SIDE
S21
SELECT IMAGE
S22
INSTRUCT TO TRANSFER
S23
IS IT NECESSARY TO TRANSMIT DECODE PROGRAM ?
S24
NO
YES
TRANSFER DECODE PROGRAM
S25
TRANSFER COMPRESSED IMAGE DATA
S26
TRANSFER FINISHED
S27
OTHER IMAGE IS SELECTED ?
S28
YES
NO
RETURN

FIG. 29


START
S31
DESIGNATE TRANSFERRED SIDE
S32
TRANSMIT COMMAND
S33
PRINTER DECODER INFORMATION RECEIVED ?
NO
YES
S34
PRINTER DECODER FUNCTION ?
POSSIBLE
IMPOSSIBLE
DECODE PROGRAM
S35
SELECT IMAGE
S36
INSTRUCT TO TRANSFER
S37
TRANSFER COMPRESSED IMAGE DATA
S38
TRANSFER FINISHED
S39
OTHER IMAGE IS SELECTED ?
YES
NO
S45
SELECT IMAGE
S46
INSTRUCT TO TRANSFER
S47
IS IT NECESSARY TO TRANSMIT DECODE PROGRAM ?
NO
YES
S48
TRANSFER DECODE PROGRAM
S49
TRANSFER COMPRESSED IMAGE DATA
S50
TRANSFER FINISHED
S51
OTHER IMAGE IS SELECTED ?
YES
NO
S40
SELECT IMAGE
S41
INSTRUCT TO TRANSFER
S42
TRANSFER UN-COMPRESSED IMAGE DATA
S43
TRANSFER FINISHED
S44
OTHER IMAGE IS SELECTED ?
YES
NO
RETURN